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NATIONAL DAM SAFETY PROGRAM. MINE LA MOTTE DAM (MO 30289), LOWE--ETC(U)
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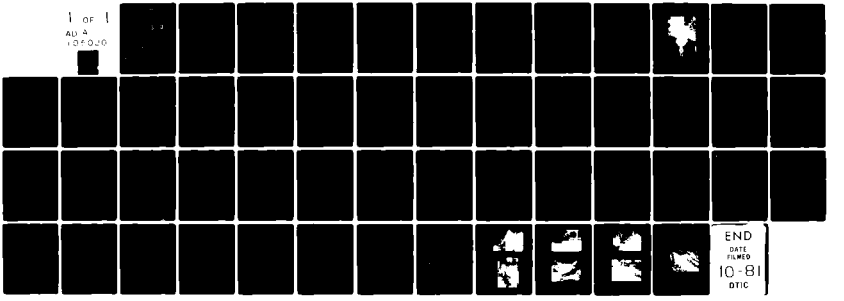

LEVEL II

LOWER MISSISSIPPI - ST. FRANCIS BASIN

MINE LA MOTTE DAM

MADISON COUNTY, MISSOURI

MO 30289

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY INSPECTION

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St. Louis District

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PREPARED BY: U. S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

FEBRUARY 1980

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7. AUTHOR(s) L. Robert Kimball and Associates	8. CONTRACT OR GRANT NUMBER(s) DACW43-79-C-0034
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.	

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DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

REPLY TO ATTENTION OF

SUBJECT: Mine La Motte Dam Phase I Inspection Report

This report presents the results of field inspection and evaluation of the Mine La Motte Dam (MO 30289).

It was prepared under the National Program of Inspection of Non-Federal Dams.

This dam has been classified as unsafe, non-emergency by the St. Louis District as a result of the application of the following criteria:

a. Spillway will not pass 50 percent of the Probable Maximum Flood without overtopping the dam.

b. Overtopping of the dam could result in failure of the dam.

c. Dam failure significantly increases the hazard to loss of life downstream.

SUBMITTED BY: SIGNED
Chief, Engineering Division — 14 APR 1980 — Date

APPROVED BY: SIGNED
Colonel, CE, District Engineer — 14 APR 1980 — Date

MINE LaMOTTE DAM

MADISON COUNTY, MISSOURI

MISSOURI INVENTORY NO. 30289

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

PREPARED BY

L. ROBERT KIMBALL AND ASSOCIATES
CONSULTING ENGINEERS AND ARCHITECTS
EBENSBURG, PENNSYLVANIA 15931

UNDER DIRECTION OF

ST. LOUIS DISTRICT, CORPS OF ENGINEERS

FOR

GOVERNOR OF MISSOURI

FEBRUARY, 1980

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in detemining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

NAME OF DAM	Mine LaMotte
STATE LOCATED	Missouri
COUNTY LOCATED	Madison
STREAM	Unnamed tributary to St. Francois River
DATE OF INSPECTION	September 6, 1979

Mine LaMotte Dam was inspected using the "Recommended Guidelines for Safety Inspection of Dams". These guidelines were developed by the Chief of Engineers, U.S. Army, Washington, D.C., with the help of federal and state agencies, professional engineering organizations, and private engineers. The resulting guidelines are considered to represent a consensus of the engineering profession.

Based on the criteria in the guidelines, the dam is in the high-hazard potential classification, which means that loss of life and appreciable property loss could occur in the event of failure of the dam. The dam is in the small size classification since it is greater than 25 feet high, but less than 40 feet high. The estimated damage zone extends approximately two miles downstream of the dam. Within this damage zone are approximately two dwellings, several buildings, a school, a road and Lake Harmony Dam.

Based on the downstream affected area the Spillway Design Flood for this dam is the PMF (Probable Maximum Flood). The spillway is capable of controlling approximately 7% of the PMF without overtopping the embankment. In addition, the spillway cannot control the 100 year storm, but can control the 10 year storm.

Deficiencies visually observed for Mine LaMotte Dam were no riprap on the upstream slope, no reservoir drain, heavy tree growth on the downstream slope, seepage and ponded water at the toe of dam and seepage present near the pool elevation on the downstream slope. There is no warning system in effect or a safety inspection program. Stability and seepage analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" are not available which is considered a deficiency. These deficiencies should be remedied at the direction of a professional engineer knowledgeable in the design and construction of earthfill dams.

R. Jeffrey Kimball

R. JEFFREY KIMBALL, P.E.
L. Robert Kimball & Associates
Vice President, Earth Sciences

James T. Hockensmith

JAMES T. HOCKENSMITH
L. Robert Kimball & Associates
Geologist

Photograph No. 1. Overview of upstream slope of dam.

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
MINE LaMOTTE DAM - I.D. NO. 30289

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the St. Louis District, Corps of Engineers, District Engineer directed that a safety inspection of Mine LaMotte Dam be made.

b. Purpose of Inspection. The purpose of the inspection was to make an assessment of the general conditon of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

c. Evaluation Criteria. Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams". These guidelines were developed with the help of several federal agencies and many state agencies, professional engineering organizations and private engineers.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances. Mine LaMotte Dam is an earthfill dam approximately 750 feet long and 26.5 feet high. The embankment crest has a bend in the upstream direction (concave). The crest width is 10 to 12 feet wide. The upstream slope is 1H:1V and the downstream slope ranges from 1H:1V to 1.5H:1V.

The spillway is located on the right abutment and is an open cut trapezoidal shaped channel. The spillway exit channel is cut in rock on the right abutment. The spillway exit channel ends at a scour hole near the toe of dam.

There are no reservoir drain pipes or other facilities to lower the reservoir water surface.

b. Location. Mine LaMotte Dam is located approximately 1 mile northeast of Mine LaMotte, Missouri, on an unnamed tributary to the St. Francois River. The dam can be located (Section 28, Township 34 North, Range 7 East) on the Fredricktown, Missouri 15 minute U.S.G.S. quadrangle.

c. Size Classification. Mine LaMotte Dam is a small size structure (26.5 feet high, 134 acre-feet).

d. Hazard Classification. Mine LaMotte Dam is a high hazard dam. Downstream conditions indicate that loss of life is probable should failure of the dam occur. The estimated damage zone downstream of the dam is approximately two miles downstream. Within this damage zone are two dwellings, a school and several buildings and roads.

e. Ownership. Mine LaMotte Dam is owned by Bob Henke. Correspondence should be addressed to:

Mr. Bob Henke
Star Route Box 352
Fredericktown, Missouri
314-867-5624

f. Purpose of Dam. Mine LaMotte Dam is used for recreation.

g. Design and Construction History. Based on interviews with the owner, Mine LaMotte Dam was reportedly built approximately 100 years ago by the St. Joe Mineral Company. Contacts to St. Joe Mineral Company indicated no design or construction history was available. The owner indicated that he purchased the dam in March, 1978, but has been associated with the dam since 1968. The owner indicated that the dam originally had a water supply pipe through the dam but in 1950 the lake was drained and the pipe was sealed. In addition, the dam was raised 3 feet in 1970 when the dam was "broke" (in the words of the owner) in three places. The spillway was constructed in 1970. The owner indicated that the "break" was related to overtopping.

h. Normal Operating Procedures. Since no means to draw down the reservoir exists, no operations are conducted at the dam. Excess inflow discharges over the spillway crest.

1.3 PERTINENT DATA

a. Drainage Area.	0.9 square miles U.S.G.S. quadrangle

b. Discharge at Damsite (cfs).

(1)	Maximum known flood at dam site	Unknown
(2)	Spillway capacity at top of dam	284

c. Elevation (feet) - Field survey based on spillway elevation 881 shown on U.S.G.S. quadrangle.

(1)	Top of dam	883.9
(2)	Spillway crest	881
(3)	Normal pool	881
(4)	Maximum pool (PMF)	886.3
(5)	Tailwater on day of inspection	857.4
(6)	Streambed at centerline of dam	856.5

d. Reservoir (feet).

(1)	Length of maximum pool	1000
(2)	Length of normal pool	1500

e. Storage (acre-feet).

(1)	Top of dam	134
(2)	Spillway crest	72
(3)	Normal pool	72
(4)	Maximum pool (PMF)	200

f. Reservoir Surface (acres).

(1)	Top of dam	24
(2)	Spillway crest	18
(3)	Normal pool	18
(4)	Maximum pool (PMF)	30

g. Dam.

(1)	Type	Earth embankment
(2)	Length	750 feet
(3)	Height	26.5 feet
(4)	Top width	11 feet
(5)	Side slopes	Upstream - 1H:1V Downstream - 1H:1V to 1.5H:1V
(6)	Zoning	Unknown
(7)	Grout curtain	Unknown
(8)	Cutoff	Unknown

h. Diversion and Regulating Tunnel. None: Reportedly sealed in 1950

i. Spillway.

(1)	Type	Earthen-trapezoidal
(2)	Length (bottom)	12 feet
(3)	Crest elevation	881 feet
(4)	Upstream channel	Lake
(5)	Downstream channel	Open cut rock in right abutment

SECTION 2 - ENGINEERING DATA

2.1 DESIGN. No design drawings, reports or data are known to exist.

2.2 CONSTRUCTION. Based on interviews with the owner, it is reported that the dam was constructed 100 years ago. No information exists on construction of the dam.

2.3 OPERATION. No operating records exist.

2.4 EVALUATION.

a. Availability. There are no engineering data available.

b. Adequacy. The field surveys and visual inspection presented herein are considered adequate to support the conclusion of this report. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions (including earthquake loads) and made a matter of record.

c. Validity. Not applicable.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General. The onsite inspection of Mine LaMotte Dam was conducted by personnel of L. Robert Kimball and Associates on September 6, 1979. The inspection team consisted of a hydrologist, structural/soils engineer and a geologist. The inspection consisted of:

1. Visual inspection of the retaining structure, abutments, and toe.

2. Examination of the spillway facilities, exposed portions of any outlet works, and other appurtenant works.

3. Observations affecting the runoff potential of the drainage basin.

b. Project Geology. Mine LaMotte Reservoir and its dam are underlain by rocks of the Cambrian aged LaMotte formation. This formation is primarily a quartzose sandstone that may grade laterally into arkose or conglomerate. The sandstone, which may be yellow, gray, red or brown, often attains thicknesses of up to 500 feet and usually overlies the Precambrian basement rocks. The only exposure in the vicinity of the dam was in the spillway itself. This showed a buff colored sandstone with some jointing indicated. The beds were about one foot in thickness.

The area around Mine LaMotte Reservoir has experienced extensive faulting in the past. The reservoir itself lies on a down thrown block in the central part of the LaMotte faults. These northwest trending faults have a displacement of about 100 feet, causing the LaMotte sandstone to be brought against the Bonneterre formation. These faults are believed to be on eastern extension of the Doe Run - Higdon fault system which is, in turn, part of the Simms Mountain fault system.

c. Dam and Spillway. The visual inspection of the dam indicated that the structure was in poor condition. From a brief survey conducted during the inspection, it was determined that the top of dam corresponds to elevation 883.9. The emergency spillway crest is at elevation 881.0. The crest width of the dam ranges from 10 to 12 feet. The upstream slope is approximately 1H:1V and contains numerous bushes and shrubs. The upstream slope also shows signs of instability. The earth material appears to be sliding into the reservoir. Additional material has recently been dumped over the upstream face and instability of this additional material is evidenced. This material is sliding into the reservoir and longitudinal cracks can be noticed approximately 2 feet back from the upstream slope. The longitudinal cracks and dumped additional fill material are located at several locations on the upstream slope.

The downstream slope of the dam ranges from 1H:1V to 1.5H:1V. Visual examination of the embankment surface material indicated a sandy clay. Numerous large trees and thick vegetation are present over the entire downstream slope. A seepage zone estimated at 2 to 3 gallons per minute was located on the downstream slope of the dam approximately 150 feet from the left abutment. This seepage zones corresponds and matches the water level surface during the inspection (elevation 881.0). It appears from visual examination that the seepage was clear. An area immediately downstream of the toe of the dam is flat and drainage is poor. Numerous seepage and wet swampy areas exist at the toe of dam and beyond the toe of dam.

The spillway is located on the right abutment and is an open cut channel. The spillway is trapezoidal in shape with a bottom width of 12 feet. The spillway exit channel is cut in rock on the right abutment of the dam. The spillway exit channel ends at a scour hole beyond the toe of dam. This scour hole acts as a stilling basin and is of sufficient distance from the embankment.

d. Drainlines. There are no facilities to drain or lower the reservoir surface. It is reported that the dam originally had a water supply pipe through the dam. In 1950 the reservoir surface was lowered and the drainline sealed.

e. Reservoir Area. No pertinent problems were noted in the reservoir area. The watershed is moderately flat and wooded.

f. Downstream Channel. The unnamed tributary to the St. Francois River downstream of Mine LaMotte Dam is of moderate width and slope before flowing into Lake Harmony Dam.

3.2 EVALUATION. The visual inspection revealed that the earth embankment is in poor condition. Both the upstream and downstream slope are very steep. The upstream slope has recently had additional material end dumped on the slope and thus shows signs of instability. The downstream slope is covered with a thick growth of trees. Seepage is exiting from one portion of the downstream slope near the reservoir water level. In addition, seepage and ponded water is present at the toe of the higher portions of the dam.

Complete evaluation of the structure can not be made without a detailed stability and seepage analysis.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES. The reservoir is maintained at the spillway crest elevation. No facilities are present to lower or drain the reservoir.

4.2 MAINTENANCE OF DAM. Maintenance in the form of dumping additional on the upstream slope of the dam and cutting the vegetation on the upstream slope of the dam is conducted by the owner. No other maintenance is performed.

4.3 MAINTENANCE OF OPERATING FACILITIES. No operating facilities are present to be maintained.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT. Upon checking with the owner, the inspection team is unaware of any warning system in effect.

4.5 EVALUATION. Maintenance of the dam and operating facilities are considered poor. There is no warning system in effect to warn downstream residences of large spillway discharges or failure of the dam.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data. There are no hydraulic or hydrological design data available as discussed in Section 2.

b. Experience Data. The drainage area was developed using the U.S.G.S. quadrangle sheet. The lake surface area was determined by planimetering the quadrangle sheet. Surface area elevations were determined by planimetering various contour lines within the drainage area on the U.S.G.S. quadrangle sheets. The spillway and dam layout was made from surveys conducted during the inspection. Despite no record of reservoir water levels, there is no history of the dam being overtopped since the dam was raised and the spillway modified in 1970 when the dam was overtopped (See Section 1.2g). No evidence presently exists of the overtopping except from the interviews with the owner.

c. Visual Observations. The spillway is located on the right abutment. The spillway control section is trapezoidal in shape with a bottom width of 12 feet. The spillway exit channel is cut in rock and is of sufficient depth.

d. Overtopping Potential. Overtopping potential was investigated through the development of the probable maximum flood (PMF) for the watershed and the subsequent routing of the PMF and fractions of the PMF through the reservoir and spillway.

The Corps of Engineers, St. Louis District, has directed that the HEC-1 Dam Safety Version systemized computer program be utilized. The program was prepared by the Hydraulic Engineering Center (HEC) U.S. Army Corp of Engineers, Davis, California, July, 1978. The major methodologies or key input data for this program are discussed in Appendix B.

Complete summary sheets for the computer output are presented in Appendix B. To facilitate review, the major results of the overtopping analysis are presented below:

Peak inflow	8,850	cfs
Spillway capacity	284	cfs

Ratio of PMF	Maximum Reservoir Water Surface El. (ft)	Maximum Depth over Dam (embankment) (ft)	Maximum Outflow, cfs	Duration of over topping, hours
.10	884.09	.19	380	1.17
.50	885.47	1.57	4189	6.33
1.00	886.32	2.42	8539	10.17

The Corps of Engineers Spillway Design Flood for a high hazard-small dam is 1/2 PMF to the PMF. Based on the downstream hazard exposure, the Spillway Design Flood for this dam has been selected to be the PMF. The spillway is capable of controlling only approximately 7% of the PMF without overtopping the embankment. Overtopping the embankment for an extended period of time or with depth will cause failure of the dam.

Because of the low spillway capacity the 10 year storm was routed through the reservoir. It was determined that the spillway can control the 10 year storm but not the 100 year storm.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations. Visual observations indicate that the dam is in poor condition. The upstream slope has had recent material end dumped over the slope. Movement and erosion of this material was noted during the inspection. Trees on the upstream slope have recently been cut above the roots. The downstream slope is very steep and covered with a thick growth of trees. Seepage was noted on the downstream slope at the approximate water level. Seepage and ponded water was present along much of the toe of the dam.

b. Design and Construction Data. No design or construction data is available on the dam. The dimensions of the dam and cross section are unknown. Stability and seepage analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspections of Dams" were not available, which is considered a deficiency.

c. Operating Records. No operating records are kept on ths structure.

d. Post Construction Changes. Post construction changes have been made to the dam but are not well documented. The reservoir drainline was plugged in 1950. The dam was raised approximately 3 feet and the spillway installed in 1970.

e. Seismic Stability. The dam is located in seismic zone 2 to which the guidelines assign a "moderate" damage potential. No seismic stability analysis has been conducted.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety. The visual observations, review of available data and hydrologic calculations indicate that Mine LaMotte Dam's spillway is seriously inadequate. The spillway is capable of controlling approximately 7% of the PMF without overtopping the embankment. In addition, the spillway and reservoir cannot control the 100 year storm but can control the 10 year storm.

The earth embankment appeared to be in poor condition. Erosion and slumping was noted on the upstream slope of the dam. Seepage and a very heavy growth of trees was noted on the downstream slope of the dam. The downstream slope is very steep. Ponded water and seepage was present at the toe of the dam. Stability and seepage analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspections of Dams" were not available, which is considered a deficiency.

b. Adequacy of Information. Complete assessment of the structural stability of the structure cannot be made because of the limited design data and construction data. Stability and seepage analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspections of Dams" were not available, which is considered a deficiency.

c. Urgency. The deficiencies described herein are serious and corrective actions listed below should be initiated immediately. Special note should be made of items in paragraph 7.2 a and b. and these recommendations should be pursued on a high priority basis.

d. Need for Phase II. In order to accomplish some of the recommendations/remedial measures outlined below, further investigations will be required. However, a Phase II investigation is not required.

7.2 RECOMMENDATIONS/REMEDIAL MEASURES

a. Alternatives. Spillway size and/or height of dam should be increased to pass the approximate spillway design flood. In either case, the spillway should be protected to prevent erosion.

b. Operation and Maintenance Procedures. The following operation and maintenance procedures are recommended:

1. Stability and seepage analyses should be conducted of the earth embankment by registered professional engineer knowledgeable in the design and construction of earth dams.

2. All seepage points should be monitored at regular intervals.

3. Institute a formal inspection program to be conducted at regular intervals.

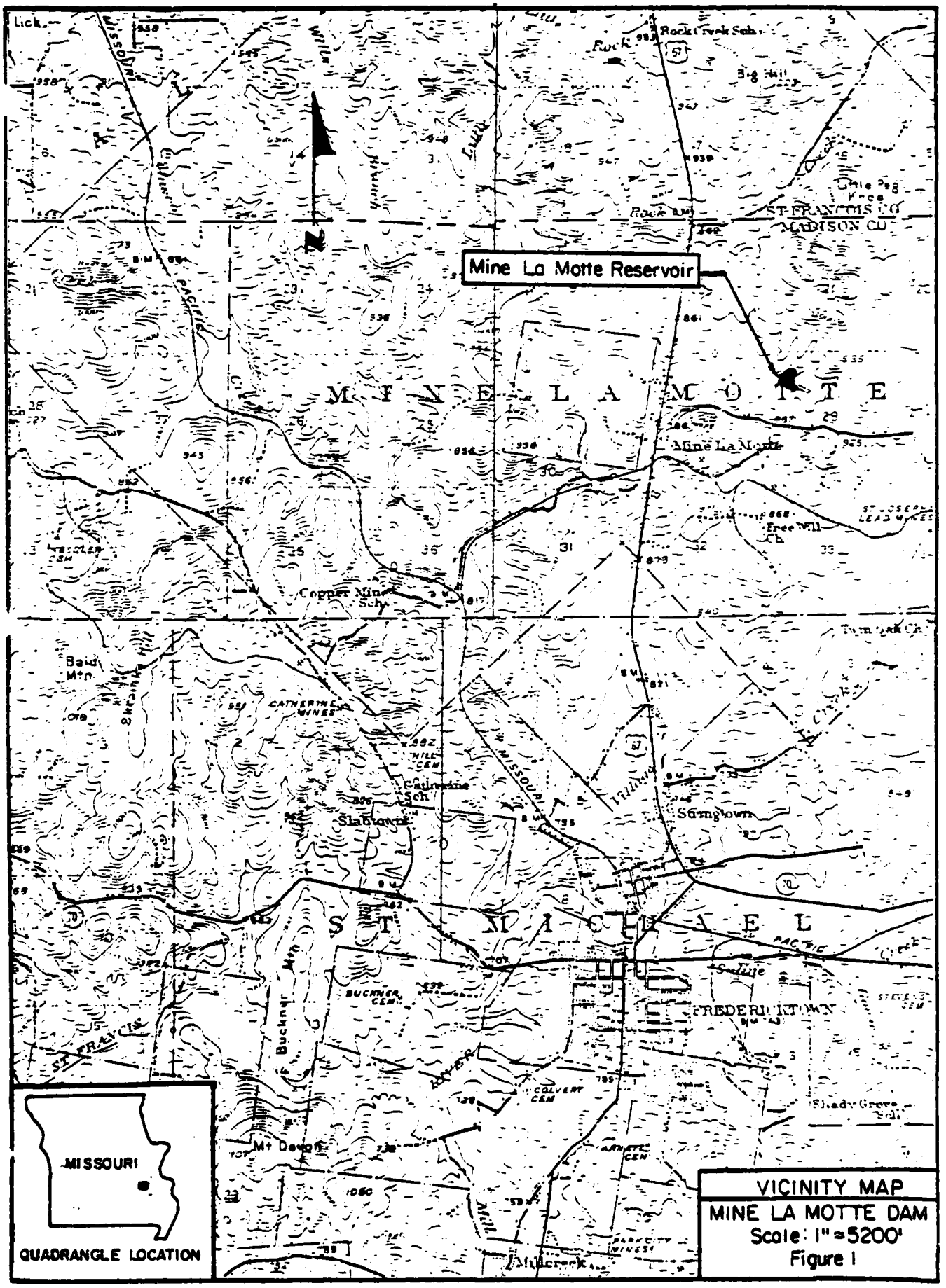
4. Institute a formal warning system to warn downstream residences of high spillway discharges or failure of the dam.

5. Provide a means to lower the reservoir water surface or draining the reservoir.

6. Riprap the upstream slope.

7. Clear trees and brush selectively from the slopes of the dam and spillway at the direction of an engineer familiar with dam design and construction. After the slopes are cleared an inspection of the downstream slope should be made. Slope clearing can result in the development of problem seepage or erosion and should be planned and executed with caution.

DRAWINGS



VICINITY MAP

MINE LA MOTTE DAM

Scale: 1" = 5200'

Figure 1

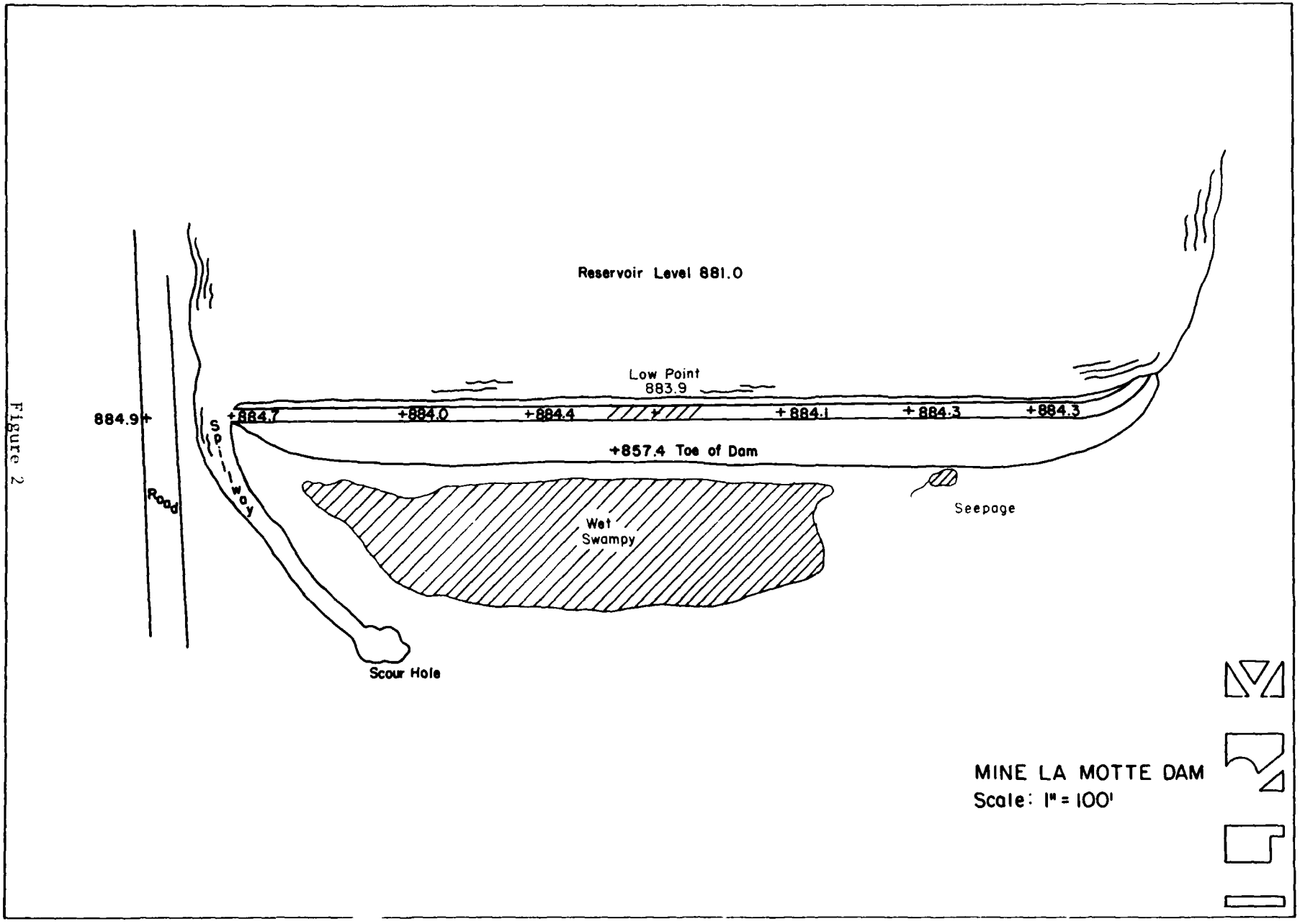
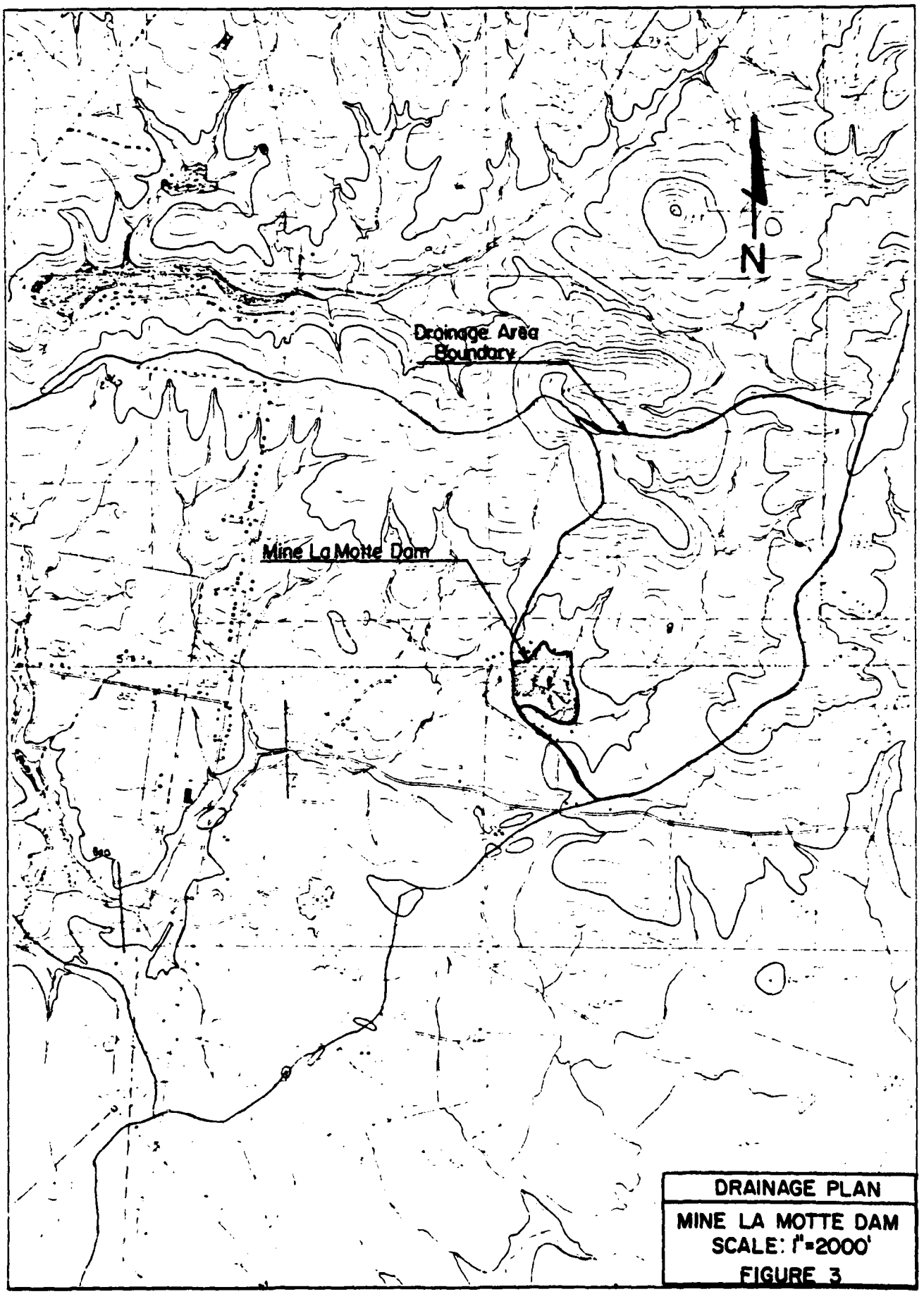

Reservoir Level 881.0
Low Point
883.9
884.9
+884.7
+884.0
+884.4
+884.1
+884.3
+884.3
+857.4 Toe of Dam
Road
Spillway
Wet
Swampy
Seepage
Scour Hole
MINE LA MOTTE DAM
Scale: 1" = 100'

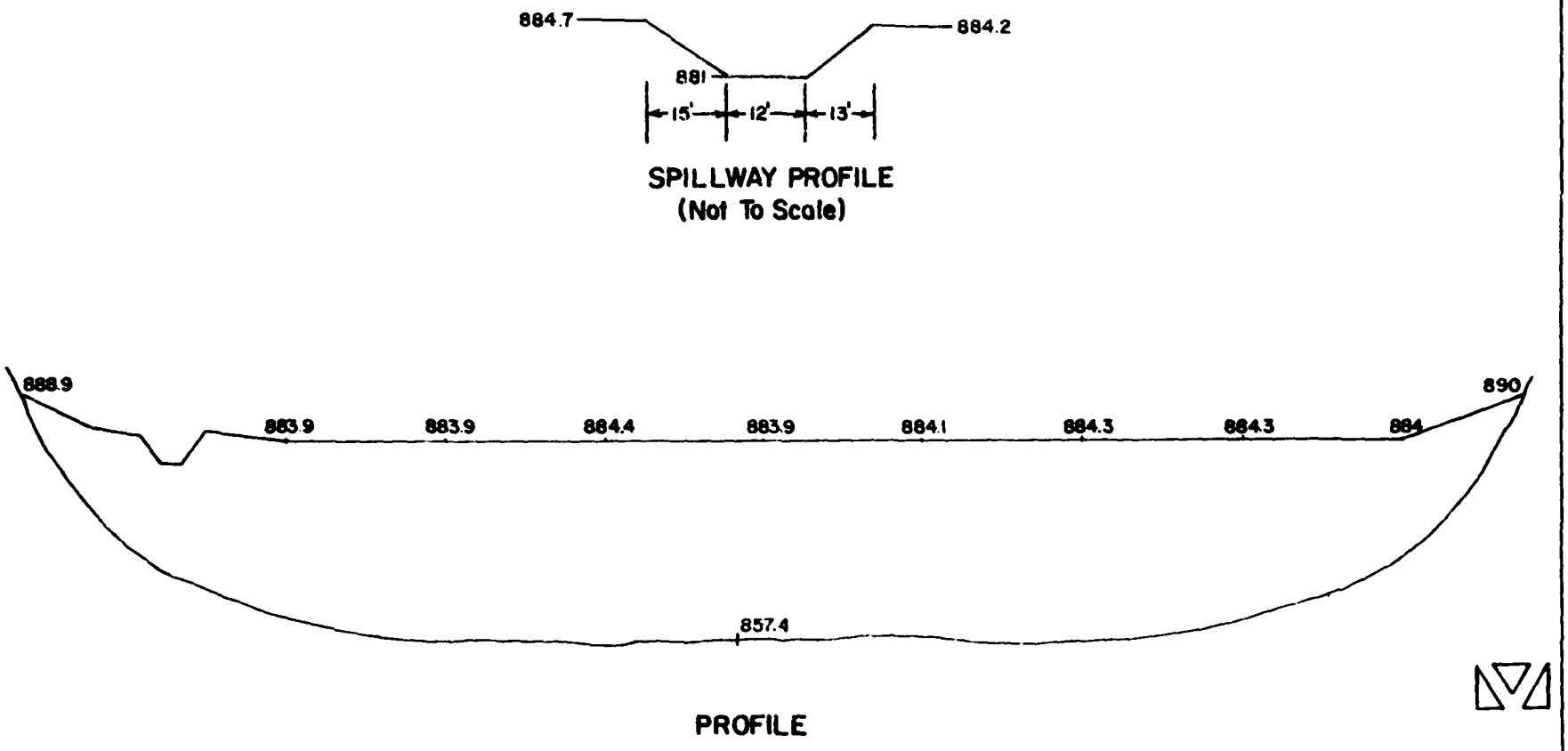
Figure 2



DRAINAGE PLAN

MINE LA MOTTE DAM
SCALE: 1"=2000'

FIGURE 3



SPILLWAY PROFILE
(Not To Scale)

PROFILE

MINE LA MOTTE DAM

SCALE: Horz. 1"=100'
Vert. 1"=20'

Figure-4

HYDROLOGY AND HYDRAULICS

APPENDIX B

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for a reservoir routing. The Probable Maximum Precipitation is derived and determined from regional charts prepared by the National Weather Service in "Hydrometeorological Report No. 33." Reduction factors have not been applied. A 48 hour storm duration is assumed with total depth distributed over 6 hour periods in accordance with procedures outlined in EM 1110-2-1411 (SPF Determination). The maximum 6 hour rainfall period is then distributed to hourly increments by the same criteria. Within-the-hour distribution is based upon NOAA Technical Memorandum NWS HYDRO-35. The non-peak 6 hour rainfall periods are distributed uniformly. All distributed values are arranged in a critical sequence by the SPF criteria. The final inflow hydrograph is produced by deduction of infiltration losses appropriate to the soil, land use, and antecedent moisture conditions.

The reservoir routing is accomplished by using Modified Puls routing techniques wherein the flood hydrograph is routed through lake storage. Hydraulic capacities of the outlet works, spillways, and crest of dam are used as outlet controls in the routing. Storage in the pool area is defined by an elevation-storage capacity curve. The hydraulic capacity of the outlet works, spillways, and top of dam are defined by elevation-discharge curves.

Dam overtopping analysis has been conducted by hydrologic methods for this dam and lake. This computation determines the percentage of the PMF hydrograph that the reservoir can contain without the dam being overtopped. An output summary in the hydrologic appendix displays this information as well as other characteristics of the simulated dam overtopping.

The above analysis has been accomplished for this report using the systemized computer program HEC-1 (Dam Safety Version), July, 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. The numeric parameters estimated for this site are listed in the computer printout. Definitions of these variables are contained in the "User's Manual" for the computer program.

The inflow hydrograph was routed through the reservoir using HEC-1's Modified Puls option.

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG PENNSYLVANIA

DAM NAME MINE LAMOTTE DAM
I.D. NUMBER 30289
SHEET NO. 1 OF 4
BY OTM DATE 9-25-79

MINE LAMOTTE DAM

DRAINAGE AREA = 0.9 mi^2 (579 AC.)
FROM U.S.G.S. 7.5-MIN. QUAD

UNIT HYDROGRAPH PARAMETERS

KIRPICH:

t_c = 0.55 HRS. LAG = 0.6 t_c = 0.3 HRS.
WHERE LENGTH (L) = 8,000 FT.
HEIGHT (H) = 179 FT.

FROM KENTUCKY BUREAU OF HIGHWAYS, TIME OF CONCENTRATION NOMOGRAPH.

CURVE NUMBER METHOD:

$$LAG = \frac{l^{0.8}(S+1)^{0.7}}{1900\ Y^{0.5}} = \frac{(8000)^{0.8}(2.49)^{0.7}}{1900\ (3.0)^{0.5}}$$

$$= \frac{(1326)(1.90)}{3291} = 0.76 \text{ HRS}$$

WHERE l = GREATEST FLOW LENGTH IN FEET.
$S = \frac{1000}{CN} - 10$ AND CN = S.C.S. CURVE NUMBER
Y = AVERAGE SLOPE

CN = 87, ANTECEDENT MOISTURE CONDITION III
SOIL GROUP "C"

FROM S.C.S.

TIME OF CONCENTRATION USED IN THIS ANALYSIS EQUALS 0.55 HRS, LAG = 0.3 HRS

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CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG PENNSYLVANIA

DAM NAME MINE LAMOTTE DAM
I.D. NUMBER 30289
SHEET NO. 2 OF 4
BY OTM DATE 9-26-79

LOSS RATE AND BASE FLOW

STRTL = 1 INCH
CNSTL = 87 SCS CURVE NO. (AMC III)
STRTQ = 1.5 cfs/M:^{2}
QRCSN = 0.05 (5% OF PEAK FLOW)
RTIOR = 2.5

PROBABLE MAXIMUM STORM

FROM H.R. No. 33

P.M.P. INDEX RAINFALL (ZONE 7) = 26.5 INCHES
R_6 = 102%, R_{12} = 120%, R_{24} = 130%, R_{48} = 140%

ELEVATION - AREA - CAPACITY RELATIONSHIP

SPILLWAY CREST ELEV. = 881.0'
INITIAL STORAGE = 72 AC.FT (ST. LOUIS DIST. C.O.E.)

FROM U.S.G.S. 7.5-MIN. QUAD

AT ELEV. 881, AREA = 18 AC.
" " 890, " = 41 AC.
" " 900, " = 73 AC.

FROM THE CONIC METHOD FOR RESERVOIR VOLUME. FLOOD HYDROGRAPH PACKAGE (HEC-1). DAM SAFETY VERSION USERS MANUAL.

$H = 3V/A = 3(72)/18 = 12'$
ELEV. WHERE AREA EQUALS ZERO;
$881' - 12' = 869'$

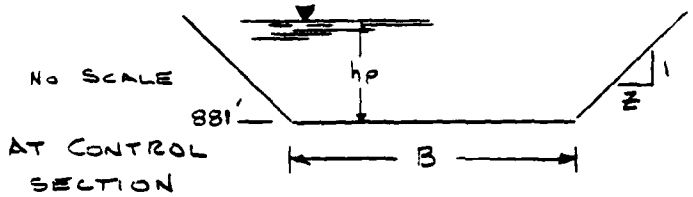
$A	0	18	30	41	50	60	73
$E	869	881	886	890	893	896	900

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG PENNSYLVANIA

DAM NAME MINE LAMOTTE DAM
I.D. NUMBER 30289
SHEET NO. 3 OF 4
BY OTM DATE 9-26-79

SPILLWAY DISCHARGE

SPILLWAY CREST = 881'



hp = VARIABLE
Z = 3.5
B = 12'
USE C' = 0.95

FROM EQ. FOR TRAPEZOIDAL SPILLWAY FLOW.

$$Q = 8.03\, C'\, h_v^{1/2} (h_p - h_v) [B + Z(h_p - h_v)]$$

WHERE $h_v = \dfrac{3(2Z h_p + B) - (16Z^2 h_p^2 + 16ZBh_p + 9B^2)^{1/2}}{10Z}$

LOW DAMS p.79, NATIONAL RESOURCE COMMITTEE.

WATER AND WASTEWATER ENGINEERING p. 11-34, FAIR, GEYER, AND OKUN

	TRAPEZOIDAL FLOW	
	HEIGHT (FT.)	*DISCHARGE (Q) (C.F.S.)
881	0	—
882	1	40
883	2	140
884	3	300 (TOP OF DAM)
885	4	510
886	5	800
888	7	1,610
890	9	2,760
895	14	7,340
900	19	14,760

*DISCHARGE ROUNDED TO NEAREST 10 C.F.S.

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG PENNSYLVANIA

DAM NAME MINE LAMOTTE DAM
I.D. NUMBER 30289
SHEET NO. 4 OF 4
BY O.T.M. DATE 9-26-79

OVERTOP PARAMETERS

DISCHARGE DETERMINED BY (HEC-1)

TOP OF DAM ELEV. (LOW SPOT) = 883.9'
LENGTH OF DAM (EXCLUDING SW.) = 750'
COEFFICIENT OF DISCHARGE = 2.9 (BROAD CREST)
$L_{MAX.}$ = 1100' , $V_{MAX.}$ = 900'

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION  JULY 1978
  LAST MODIFICATION  26 FEB 79
**********
    1          A1       ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF
    2          A2       HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF MINE LAMOTTE DAM
    3          A3       RATIOS OF PMF ROUTED THROUGH THE RESERVOIR (MISSOURI - 302891)
    4          B     288        0        5        0        0        0        0        0        0        0
    5          B1      5
    6          J       1        3        1
    7          J1     .1       .5        1
    8          K       0        1                                            1
    9          K1       INFLOW
   10          M       1        2      0.9                                   1                        1
   11          P                26.5      102      120      130
   12          T                                                           -1      -87
   13          W2               0.3
   14          X    -1.5     -.05      2.5
   15          K       1        2                                            1
   16          K1       ROUTE THRU LAMOTTE
   17          Y                                   1        1
   18          Y1      1                                                 -881       -1
   19          Y4    881      882      883      884      885      886      888      890      895      900
   20          Y5      0       40      140      300      510      800     1610     2760     7340    14760
   21          SA      0       18       30       41       50       60       73
   22          SE    869      881      886      890      893      896      900
   23          SS    881
   24          SD  883.9      2.9      1.5      750
   25          SL     70      300      635      790      890      995     1100
   26          SV  883.9      884    884.4      885      890      895      900
   27          K      99
```

****
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
****

RUN DATE= 79/09/28.
TIME= 07.51.13.

ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF
HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF MINE LAMOTTE DAM
RATIOS OF PMF ROUTED THROUGH THE RESERVOIR (MISSOURI = 30289)

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
288	0	5	0	0	0	0	0	0	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 3 LRTIO= 1

RTIOS= .10 .50 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	.90	0.00	.90	1.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	26.50	102.00	120.00	130.00	0.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	-1.00	-87.00	0.00	0.00

CURVE NO = -87.00 WETNESS = -1.00 EFFECT CN = 87.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .30

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.50

UNIT HYDROGRAPH 20 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .30 VOL= 1.00

178.	574.	1090.	1272.	1168.	914.	580.	388.	266.	177.
121.	80.	54.	36.	25.	17.	12.	8.	5.	2.

0 MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	0.00	.01	1.	1.01	12.05	145	.23	.22	.01	466.
1.01	.10	2	.01	0.00	.01	1.	1.01	12.10	146	.23	.22	.01	554.
1.01	.15	3	.01	0.00	.01	1.	1.01	12.15	147	.23	.22	.01	721.
1.01	.20	4	.01	0.00	.01	1.	1.01	12.20	148	.23	.22	.01	915.
1.01	.25	5	.01	0.00	.01	1.	1.01	12.25	149	.23	.22	.01	1095.
1.01	.30	6	.01	0.00	.01	1.	1.01	12.30	150	.23	.22	.01	1236.
1.01	.35	7	.01	0.00	.01	1.	1.01	12.35	151	.23	.22	.01	1327.
1.01	.40	8	.01	0.00	.01	1.	1.01	12.40	152	.23	.22	.01	1389.
1.01	.45	9	.01	0.00	.01	1.	1.01	12.45	153	.23	.22	.01	1432.
1.01	.50	10	.01	0.00	.01	1.	1.01	12.50	154	.23	.22	.01	1462.
1.01	.55	11	.01	0.00	.01	0.	1.01	12.55	155	.23	.22	.01	1483.
1.01	1.00	12	.01	0.00	.01	0.	1.01	13.00	156	.23	.22	.01	1498.
1.01	1.05	13	.01	0.00	.01	0.	1.01	13.05	157	.27	.26	.01	1516.
1.01	1.10	14	.01	0.00	.01	0.	1.01	13.10	158	.27	.26	.01	1549.
1.01	1.15	15	.01	0.00	.01	0.	1.01	13.15	159	.27	.26	.01	1603.
1.01	1.20	16	.01	0.00	.01	0.	1.01	13.20	160	.27	.27	.01	1664.
1.01	1.25	17	.01	0.00	.01	0.	1.01	13.25	161	.27	.27	.01	1719.
1.01	1.30	18	.01	0.00	.01	0.	1.01	13.30	162	.27	.27	.00	1762.
1.01	1.35	19	.01	0.00	.01	0.	1.01	13.35	163	.27	.27	.00	1791.
1.01	1.40	20	.01	0.00	.01	0.	1.01	13.40	164	.27	.27	.00	1810.
1.01	1.45	21	.01	.00	.01	0.	1.01	13.45	165	.27	.27	.00	1823.
1.01	1.50	22	.01	.00	.01	0.	1.01	13.50	166	.27	.27	.00	1833.
1.01	1.55	23	.01	.00	.01	1.	1.01	13.55	167	.27	.27	.00	1840.
1.01	2.00	24	.01	.00	.01	1.	1.01	14.00	168	.27	.27	.00	1845.
1.01	2.05	25	.01	.00	.01	2.	1.01	14.05	169	.34	.33	.00	1860.
1.01	2.10	26	.01	.00	.01	3.	1.01	14.10	170	.34	.33	.00	1902.
1.01	2.15	27	.01	.00	.01	5.	1.01	14.15	171	.34	.33	.00	1977.
1.01	2.20	28	.01	.00	.01	6.	1.01	14.20	172	.34	.33	.00	2064.
1.01	2.25	29	.01	.00	.01	8.	1.01	14.25	173	.34	.33	.00	2142.
1.01	2.30	30	.01	.00	.01	9.	1.01	14.30	174	.34	.33	.00	2206.
1.01	2.35	31	.01	.00	.01	11.	1.01	14.35	175	.34	.33	.00	2246.
1.01	2.40	32	.01	.00	.01	13.	1.01	14.40	176	.34	.33	.00	2273.
1.01	2.45	33	.01	.00	.01	14.	1.01	14.45	177	.34	.33	.00	2292.
1.01	2.50	34	.01	.00	.01	16.	1.01	14.50	178	.34	.33	.00	2305.
1.01	2.55	35	.01	.00	.01	17.	1.01	14.55	179	.34	.34	.00	2314.
1.01	3.00	36	.01	.00	.01	19.	1.01	15.00	180	.34	.34	.00	2321.
1.01	3.05	37	.01	.00	.01	20.	1.01	15.05	181	.21	.20	.00	2302.
1.01	3.10	38	.01	.00	.01	22.	1.01	15.10	182	.41	.41	.00	2266.
1.01	3.15	39	.01	.00	.01	23.	1.01	15.15	183	.41	.41	.00	2242.
1.01	3.20	40	.01	.00	.01	24.	1.01	15.20	184	.62	.61	.00	2336.
1.01	3.25	41	.01	.00	.01	26.	1.01	15.25	185	.72	.71	.00	2578.
1.01	3.30	42	.01	.00	.01	27.	1.01	15.30	186	1.75	1.74	.01	3161.
1.01	3.35	43	.01	.00	.01	28.	1.01	15.35	187	2.88	2.86	.01	4430.
1.01	3.40	44	.01	.00	.01	30.	1.01	15.40	188	1.13	1.13	.00	6319.
1.01	3.45	45	.01	.01	.01	31.	1.01	15.45	189	.72	.72	.00	8127.
1.01	3.50	46	.01	.01	.01	32.	1.01	15.50	190	.62	.61	.00	8850.
1.01	3.55	47	.01	.01	.01	33.	1.01	15.55	191	.41	.41	.00	8508.
1.01	4.00	48	.01	.01	.01	34.	1.01	16.00	192	.41	.41	.00	7458.
1.01	4.05	49	.01	.01	.01	35.	1.01	16.05	193	.32	.31	.00	6146.
1.01	4.10	50	.01	.01	.01	36.	1.01	16.10	194	.32	.31	.00	5088.
1.01	4.15	51	.01	.01	.01	37.	1.01	16.15	195	.32	.31	.00	4254.
1.01	4.20	52	.01	.01	.01	38.	1.01	16.20	196	.32	.31	.00	3611.
1.01	4.25	53	.01	.01	.01	39.	1.01	16.25	197	.32	.31	.00	3157.
1.01	4.30	54	.01	.01	.01	40.	1.01	16.30	198	.32	.31	.00	2837.
1.01	4.35	55	.01	.01	.01	41.	1.01	16.35	199	.32	.31	.00	2624.
1.01	4.40	56	.01	.01	.01	42.	1.01	16.40	200	.32	.31	.00	2483.

1.01	4.45	57	.01	.01	.01	43.	1.01	16.45	201	.32	.31	.00	2388.
1.01	4.50	58	.01	.01	.01	44.	1.01	16.50	202	.32	.31	.00	2324.
1.01	4.55	59	.01	.01	.01	45.	1.01	16.55	203	.32	.31	.00	2282.
1.01	5.00	60	.01	.01	.01	46.	1.01	17.00	204	.32	.31	.00	2251.
1.01	5.05	61	.01	.01	.01	47.	1.01	17.05	205	.25	.25	.00	2219.
1.01	5.10	62	.01	.01	.01	47.	1.01	17.10	206	.25	.25	.00	2159.
1.01	5.15	63	.01	.01	.01	48.	1.01	17.15	207	.25	.25	.00	2075.
1.01	5.20	64	.01	.01	.01	49.	1.01	17.20	208	.25	.25	.00	1985.
1.01	5.25	65	.01	.01	.01	50.	1.01	17.25	209	.25	.25	.00	1905.
1.01	5.30	66	.01	.01	.01	50.	1.01	17.30	210	.25	.25	.00	1842.
1.01	5.35	67	.01	.01	.01	51.	1.01	17.35	211	.25	.25	.00	1802.
1.01	5.40	68	.01	.01	.01	52.	1.01	17.40	212	.25	.25	.00	1776.
1.01	5.45	69	.01	.01	.01	53.	1.01	17.45	213	.25	.25	.00	1758.
1.01	5.50	70	.01	.01	.01	53.	1.01	17.50	214	.25	.25	.00	1746.
1.01	5.55	71	.01	.01	.01	54.	1.01	17.55	215	.25	.25	.00	1738.
1.01	6.00	72	.01	.01	.01	55.	1.01	18.00	216	.25	.25	.00	1733.
1.01	6.05	73	.07	.04	.03	60.	1.01	18.05	217	.02	.02	.00	1689.
1.01	6.10	74	.07	.04	.03	78.	1.01	18.10	218	.02	.02	.00	1558.
1.01	6.15	75	.07	.04	.03	112.	1.01	18.15	219	.02	.02	.00	1310.
1.01	6.20	76	.07	.04	.02	153.	1.01	18.20	220	.02	.02	.00	1023.
1.01	6.25	77	.07	.04	.02	193.	1.01	18.25	221	.02	.02	.00	759.
1.01	6.30	78	.07	.04	.02	226.	1.01	18.30	222	.02	.02	.00	553.
1.01	6.35	79	.07	.05	.02	251.	1.01	18.35	223	.02	.02	.00	436.
1.01	6.40	80	.07	.05	.02	270.	1.01	18.40	224	.02	.02	.00	398.
1.01	6.45	81	.07	.05	.02	285.	1.01	18.45	225	.02	.02	.00	369.
1.01	6.50	82	.07	.05	.02	298.	1.01	18.50	226	.02	.02	.00	331.
1.01	6.55	83	.07	.05	.02	308.	1.01	18.55	227	.02	.02	.00	302.
1.01	7.00	84	.07	.05	.02	317.	1.01	19.00	228	.02	.02	.00	276.
1.01	7.05	85	.07	.05	.02	325.	1.01	19.05	229	.02	.02	.00	252.
1.01	7.10	86	.07	.05	.01	332.	1.01	19.10	230	.02	.02	.00	230.
1.01	7.15	87	.07	.05	.01	339.	1.01	19.15	231	.02	.02	.00	210.
1.01	7.20	88	.07	.05	.01	345.	1.01	19.20	232	.02	.02	.00	191.
1.01	7.25	89	.07	.05	.01	350.	1.01	19.25	233	.02	.02	.00	175.
1.01	7.30	90	.07	.05	.01	355.	1.01	19.30	234	.02	.02	.00	159.
1.01	7.35	91	.07	.05	.01	359.	1.01	19.35	235	.02	.02	.00	154.
1.01	7.40	92	.07	.05	.01	364.	1.01	19.40	236	.02	.02	.00	154.
1.01	7.45	93	.07	.05	.01	368.	1.01	19.45	237	.02	.02	.00	154.
1.01	7.50	94	.07	.06	.01	371.	1.01	19.50	238	.02	.02	.00	154.
1.01	7.55	95	.07	.06	.01	375.	1.01	19.55	239	.02	.02	.00	154.
1.01	8.00	96	.07	.06	.01	378.	1.01	20.00	240	.02	.02	.00	154.
1.01	8.05	97	.07	.06	.01	381.	1.01	20.05	241	.02	.02	.00	154.
1.01	8.10	98	.07	.06	.01	384.	1.01	20.10	242	.02	.02	.00	154.
1.01	8.15	99	.07	.06	.01	387.	1.01	20.15	243	.02	.02	.00	154.
1.01	8.20	100	.07	.06	.01	389.	1.01	20.20	244	.02	.02	.00	154.
1.01	8.25	101	.07	.06	.01	392.	1.01	20.25	245	.02	.02	.00	154.
1.01	8.30	102	.07	.06	.01	394.	1.01	20.30	246	.02	.02	.00	154.
1.01	8.35	103	.07	.06	.01	396.	1.01	20.35	247	.02	.02	.00	154.
1.01	8.40	104	.07	.06	.01	398.	1.01	20.40	248	.02	.02	.00	154.
1.01	8.45	105	.07	.06	.01	401.	1.01	20.45	249	.02	.02	.00	154.
1.01	8.50	106	.07	.06	.01	402.	1.01	20.50	250	.02	.02	.00	154.
1.01	8.55	107	.07	.06	.01	404.	1.01	20.55	251	.02	.02	.00	154.
1.01	9.00	108	.07	.06	.01	406.	1.01	21.00	252	.02	.02	.00	154.
1.01	9.05	109	.07	.06	.01	408.	1.01	21.05	253	.02	.02	.00	154.
1.01	9.10	110	.07	.06	.01	409.	1.01	21.10	254	.02	.02	.00	154.
1.01	9.15	111	.07	.06	.01	411.	1.01	21.15	255	.02	.02	.00	154.
1.01	9.20	112	.07	.06	.01	412.	1.01	21.20	256	.02	.02	.00	154.
1.01	9.25	113	.07	.06	.01	414.	1.01	21.25	257	.02	.02	.00	154.
1.01	9.30	114	.07	.06	.01	415.	1.01	21.30	258	.02	.02	.00	154.
1.01	9.35	115	.07	.06	.01	416.	1.01	21.35	259	.02	.02	.00	154.
1.01	9.40	116	.07	.06	.01	418.	1.01	21.40	260	.02	.02	.00	154.

1.01	9.45	117	.07	.06	.01	419.	1.01	21.45	261	.02	.02	.00	154.
1.01	9.50	118	.07	.06	.01	420.	1.01	21.50	262	.02	.02	.00	154.
1.01	9.55	119	.07	.06	.01	421.	1.01	21.55	263	.02	.02	.00	154.
1.01	10.00	120	.07	.06	.01	422.	1.01	22.00	264	.02	.02	.00	154.
1.01	10.05	121	.07	.06	.00	423.	1.01	22.05	265	.02	.02	.00	154.
1.01	10.10	122	.07	.06	.00	424.	1.01	22.10	266	.02	.02	.00	154.
1.01	10.15	123	.07	.06	.00	425.	1.01	22.15	267	.02	.02	.00	154.
1.01	10.20	124	.07	.06	.00	426.	1.01	22.20	268	.02	.02	.00	154.
1.01	10.25	125	.07	.06	.00	427.	1.01	22.25	269	.02	.02	.00	154.
1.01	10.30	126	.07	.06	.00	427.	1.01	22.30	270	.02	.02	.00	154.
1.01	10.35	127	.07	.06	.00	428.	1.01	22.35	271	.02	.02	.00	154.
1.01	10.40	128	.07	.06	.00	429.	1.01	22.40	272	.02	.02	.00	154.
1.01	10.45	129	.07	.06	.00	430.	1.01	22.45	273	.02	.02	.00	154.
1.01	10.50	130	.07	.06	.00	431.	1.01	22.50	274	.02	.02	.00	154.
1.01	10.55	131	.07	.06	.00	431.	1.01	22.55	275	.02	.02	.00	154.
1.01	11.00	132	.07	.06	.00	432.	1.01	23.00	276	.02	.02	.00	154.
1.01	11.05	133	.07	.06	.00	433.	1.01	23.05	277	.02	.02	.00	154.
1.01	11.10	134	.07	.06	.00	433.	1.01	23.10	278	.02	.02	.00	154.
1.01	11.15	135	.07	.06	.00	434.	1.01	23.15	279	.02	.02	.00	154.
1.01	11.20	136	.07	.06	.00	434.	1.01	23.20	280	.02	.02	.00	154.
1.01	11.25	137	.07	.06	.00	435.	1.01	23.25	281	.02	.02	.00	154.
1.01	11.30	138	.07	.06	.00	436.	1.01	23.30	282	.02	.02	.00	154.
1.01	11.35	139	.07	.06	.00	436.	1.01	23.35	283	.02	.02	.00	154.
1.01	11.40	140	.07	.06	.00	437.	1.01	23.40	284	.02	.02	.00	154.
1.01	11.45	141	.07	.06	.00	437.	1.01	23.45	285	.02	.02	.00	154.
1.01	11.50	142	.07	.06	.00	438.	1.01	23.50	286	.02	.02	.00	154.
1.01	11.55	143	.07	.06	.00	438.	1.01	23.55	287	.02	.02	.00	154.
1.01	12.00	144	.07	.06	.00	439.	1.02	0.00	288	.02	.02	.00	154.
									SUM	34.45	32.72	1.73	227977.
										(875.)(	831.)(	44.)(	6455.59)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8850.	2554.	791.	791.	227884.
CMS	251.	72.	22.	22.	6453.
INCHES		26.39	32.71	32.71	32.71
MM		670.43	830.93	830.93	830.93
AC-FT		1266.	1569.	1569.	1569.
THOUS CU M		1562.	1936.	1936.	1936.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	885.	255.	79.	79.	22788.
CMS	25.	7.	2.	2.	645.
INCHES		2.64	3.27	3.27	3.27
MM		67.04	83.09	83.09	83.09
AC-FT		127.	157.	157.	157.
THOUS CU M		156.	194.	194.	194.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4425.	1277.	396.	396.	113942.
CMS	125.	36.	11.	11.	3226.
INCHES		13.20	16.36	16.36	16.36
MM		335.21	415.46	415.46	415.46
AC-FT		633.	785.	785.	785.
THOUS CU M		781.	968.	968.	968.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8850.	2554.	791.	791.	227884.
CMS	251.	72.	22.	22.	6453.
INCHES		26.39	32.71	32.71	32.71
MM		670.43	830.93	830.93	830.93
AC-FT		1266.	1569.	1569.	1569.
THOUS CU M		1562.	1936.	1936.	1936.

****

HYDROGRAPH ROUTING

ROUTE THRU LAMOTTE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT

		1	0	0.	0.000	0.000	0.000	-881.	-1
STAGE	881.00	882.00	883.00	884.00	885.00	886.00	888.00	890.00	895.00
FLOW	0.00	40.00	140.00	300.00	510.00	800.00	1610.00	2760.00	7340.00
SURFACE AREA=	0.	18.	30.	41.	50.	60.	73.		
CAPACITY=	0.	72.	191.	332.	468.	633.	899.		
ELEVATION=	869.	881.	886.	890.	893.	896.	900.		

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
881.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
883.9	2.9	1.5	750.

CREST LENGTH AT OR BELOW ELEVATION	70.	300.	635.	790.	890.	995.	1100.
	883.9	884.0	884.4	885.0	890.0	895.0	900.0

STATION 2. PLAN 1. RATIO 1

PEAK OUTFLOW IS 380. AT TIME 16.33 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	380.	208.	70.	70.	20211.
CMS	11.	6.	2.	2.	572.
INCHES		2.15	2.90	2.90	2.90
MM		54.53	73.69	73.69	73.69
AC-FT		103.	139.	139.	139.
THOUS CU M		127.	172.	172.	172.

STATION 2. PLAN 1. RATIO 2

PEAK OUTFLOW IS 4189. AT TIME 15.92 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4189.	1249.	380.	380.	109385.
CMS	119.	35.	11.	11.	3097.
INCHES		12.91	15.70	15.70	15.70
MM		327.82	398.85	398.85	398.85
AC-FT		619.	753.	753.	753.
THOUS CU M		764.	929.	929.	929.

STATION 2. PLAN 1. RATIO 3

END-OF-PERIOD HYDROGRAPH ORDINATES

PEAK OUTFLOW IS 8539. AT TIME 15.92 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8539.	2545.	769.	769.	221496.
CMS	242.	72.	22.	22.	6272.
INCHES		26.30	31.80	31.80	31.80
MM		668.05	807.64	807.64	807.64
AC-FT		1262.	1525.	1525.	1525.
THOUS CU M		1556.	1882.	1882.	1882.

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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .10	RATIO 2 .50	RATIO 3 1.00
HYDROGRAPH AT	1	.90 (2.33)	1	885. (25.06)	4425. (125.30)	8850. (250.59)
ROUTED TO	2	.90 (2.33)	1	380. (10.75)	4189. (118.63)	8539. (241.80)

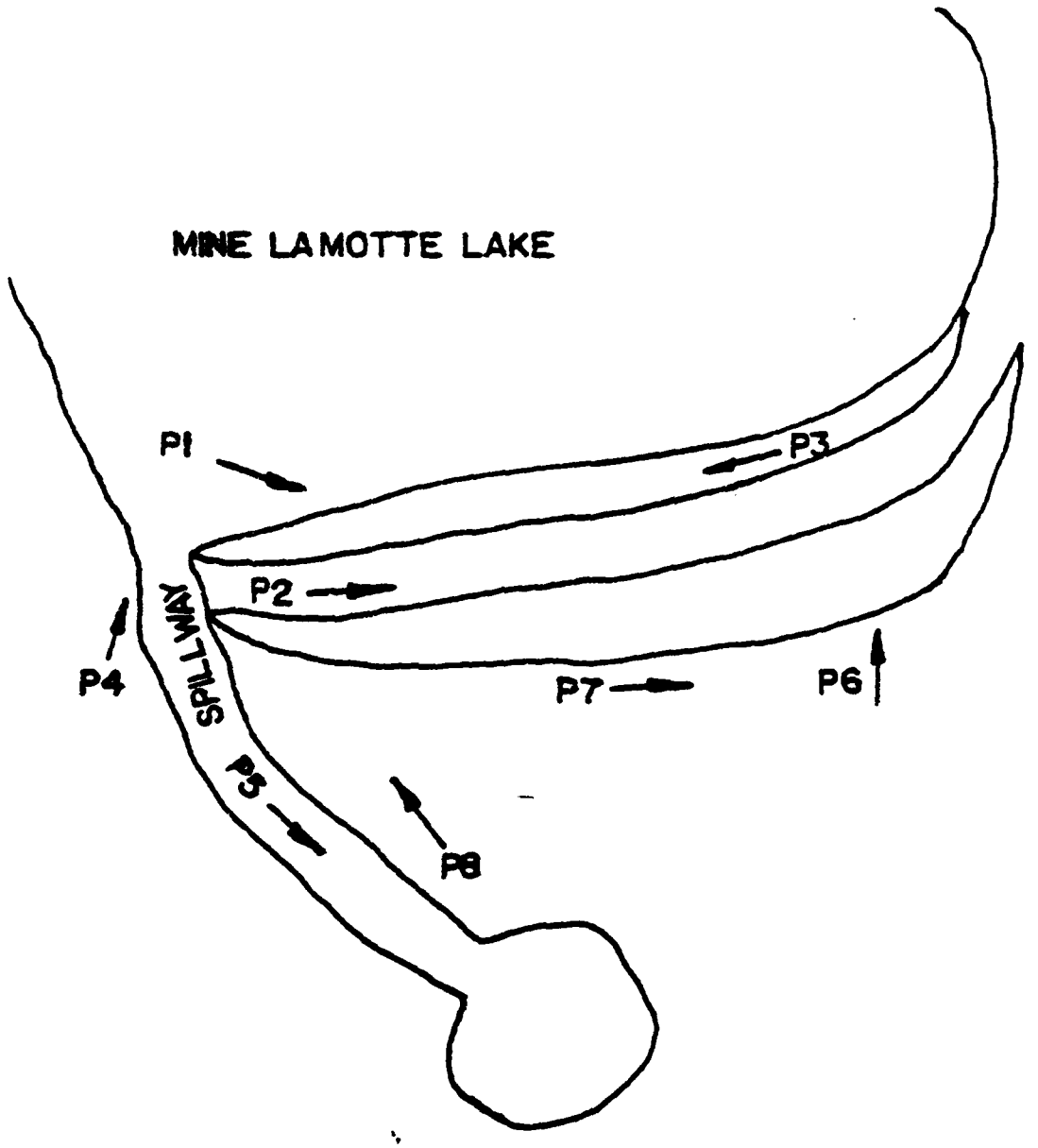
SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	881.00	881.00	883.90
STORAGE	72.	72.	139.
OUTFLOW	0.	0.	284.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	884.09	.19	138.	380.	1.17	18.33	0.00
.50	885.47	1.57	175.	4189.	6.33	15.92	0.00
1.00	886.32	2.42	200.	8539.	10.17	15.92	0.00

PHOTOGRAPHS



P- INDICATES PHOTO LOCATION

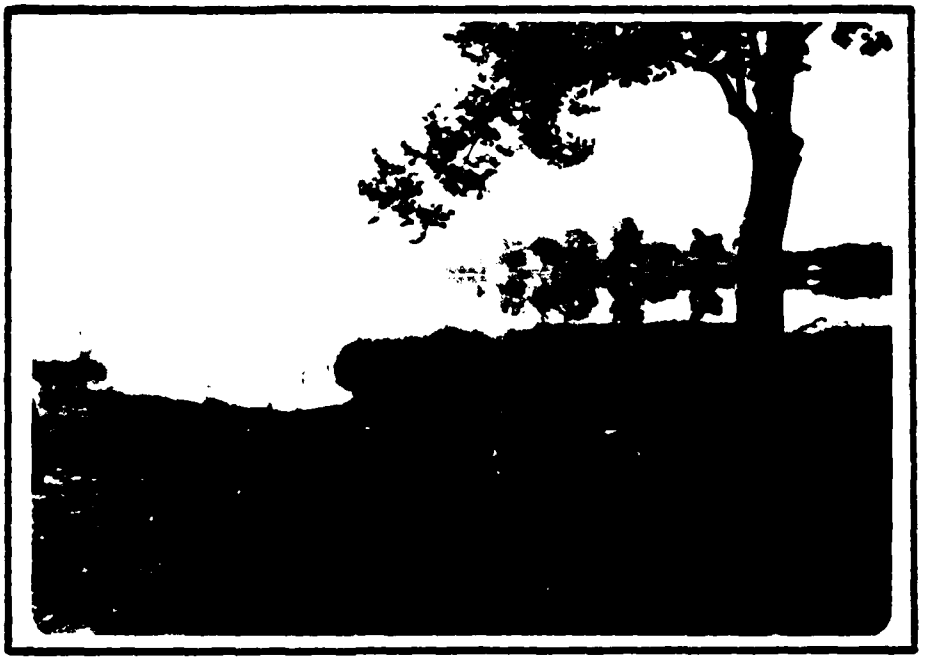
MINE LA MOTTE DAM
PHOTO INDEX

Photograph No. 2

Crest of dam looking toward left abutment.

Photograph No. 3

Upstream slope of dam.



Photograph No. 4

Spillway control section.

Photograph No. 5

Spillway exit channel.

Photograph No. 6

Downstream slope of dam.

Photograph No. 7

Seepage and wet areas at toe.

Photograph No. 8

Ponded water at toe of dam.